Research Note 84-82

AD-A142 543

EARLY TRAINING ESTIMATION SYSTEM (ETES) FINAL REPORT APPENDIX I: USER'S GUIDE: AUTOMATED RESOURCE AND COST ESTIMATION TECHNIQUE

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Research Institute for the Behavioral and Social Sciences

June 1984

REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Research Note 84-82	2. GOVT ACCESSION NO. AD-A142543	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) **EARLY TRAINING ESTIMATION SYSTEM: FINAL REPORT** APPENDIX I: USER'S GUIDE: AUTOMATED RESOURCE AND COST ESTIMATION TECHNIQUE		5. TYPE OF REPORT & PERIOD COVERED FINAL 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Lawrence H. O'Brien, Donya Boylston, Robert Kistler		8. CONTRACT OR GRANT NUMBER(s) MDA-903-80-C-0525
9. PERFORMING ORGANIZATION NAME AND ADDRESS **DYNAMICS RESEARCH CORPORATION** 60 Concord Street Wilmington, Massachusetts 01887		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 2Q162722A791
11. CONTROLLING OFFICE NAME AND ADDRESS Army Research Institute 5001 Eisenhower Avenue Alexandria, Virginia 22333		12. REPORT DATE June 1984 13. NUMBER OF PAGES 67
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office) US Army Research Institute for the Behavioral and Social Sciences Fort Bliss Field Unit, P.O. Box 6057 Fort Bliss, TX 79916		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES Charles Jorgensen, Contracting Officers Representative		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Training Instructional System Development Data Base Management Task Analysis Training Estimation Simulation Training Effectiveness Training Effectiveness Analysis Front End Analysis		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report describes the research and development activities conducted under the Early Training Estimation System (ETES) development project. The Early Training Estimation System (ETES) is an integrated set of procedures and automated tools for estimating training requirements during the earliest phases of the weapon system acquisition process. The ETES has three major components; a System Description Technology (SDT), Early Training Estimation Aids and Procedures (TEAP), and Evaluative Technology. The SDT is a data base management system for storing and tracking task and training-related		

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UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

data. The data in the SDT is used in the TEAP to estimate training requirements for a new system. These training requirements include estimates of task requirements, course requirements, and resource requirements as well as estimates of training costs, training efficiency, and training effectiveness. In the Evaluative Technology, the integrated impacts of training requirements are assessed, training alternatives are evaluated, tradeoff and sensitivity analyses of key parameters are conducted, and the relationships between ETES outputs and key Army acquisition documents and processes are specified.

This report provides an overview of the components of ETES, describes the research conducted under each of the five ETES study tasks; and outlines future directions for improving ETES.

The final report and Appendixes are published as separate volumes as follows:

Final Report: ARI Research Note 84-78 (includes Appendixes A through E)

Appendix F, User's Guide: ARI Research Note 84-79

Appendix G, User's Guide, System Description Technology: ARI Research Note 84-80

Appendix H, User's Guide, Media Selection Program: ARI Research Note 84-81

Appendix I, User's Guide, Automated Resource and Cost Estimation Technique: ARI Research Note 84-82

Appendix J, User's Guide, Automated Planning and Scheduling Technique for Individual and Collective Training Plan: ARI Research Note 84-83

PREFACE

This user's guide is part of the Early Training Estimation System (ETES). Development of the ETES was sponsored by the Army Research Institute (ARI) under contract No. MDA-903-80 C-0525. Dynamics Research Corporation (DRC) of Wilmington, Massachusetts was the contractor. The contract monitor for the project was Dr. Charles Jorgensen. The conceptual technique framework for the Automated Resource and Cost Estimation was developed by Dr. Lawrence O'Brien and Ms. Donya Boylston. The Automated Resource and Cost Technique software was developed by Ms. Boylston and Mr. Robert Kistler.

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SECTION 1 - INTRODUCTION

1.1 OBJECTIVE

This user's guide provides detailed instructions on how to use the Automated Resource and Cost Estimation Technique. The objective of this technique is to provide Army Training analysts with an automated tool for estimating instructor requirements and institutional training costs during the earliest phases of the acquisition process.

The Automated Resource and Cost Estimation Technique is part of the Early Training Estimation System (ETES). An overview of the other components of ETES is provided in the ETES User's Guide. The ETES User's Guide describes procedures for developing a quasi-program of instruction for a new course. It also includes procedures for estimating several key training resource elements such as the number of students to be trained.

The Automated Resource and Cost Estimation Technique (RCET) is designed to use input data from the ETES data base management system, that is, the System Description Technology (SDT). Actual calculation of instructors and institutional training course cost in RCET is accomplished by using the VISICALC automated worksheet software developed by Visicorp. The VISICALC worksheet is also used to conduct sensitivity analyses of key parameters.

1.2 POTENTIAL USERS

The Resource and Cost Estimation Technique (RCET) has been designed for use by Army technical analysts who are directly concerned with training development for new Army Weapon Systems. The primary user organizations are expected to be: (1) the Training Development Directorates in the Army schools associated with development of new systems, (2) Program Manager's Office for new systems, particularly those individuals concerned with training development components of Integrated Logistics Support, (3) the TRADOC System Manager (TSM), (4) other Army organizations concerned with training development such as the TRADOC Systems Analysis Activity (TRASANA) and PM TRADE, and (5) contractors who must develop training requirements for new systems. It is assumed that RCET users are familiar with the basic Army training development terminology and processes.

1.3 CONCEPTUAL OVERVIEW

The Resource and Cost Estimation Technique has three components:

(1) SLT Interface Software - this software is used to select and remove data from the SDT and to format the data for use in the VISICALC program. In addition, it is used to copy the results of the VISICALC program back into the SDT.

(2) Tailored VISICALC Worksheet - this worksheet contains the equations for determining the number of instructors and course costs. In addition, it

contains all of the commands needed to load and unload the SDT input file, and to conduct sensitivity analyses. This tailored worksheet saves the user from the somewhat tedious process of setting up a VISICALC worksheet and command structure.

(3) Manual Procedures - these procedures describe how to develop input data and how to use the SDT interface software and the tailored VISICALC worksheet.

There are two major products of RCET: (1) a listing of the number of instructors required in the course and (2) a listing of projected costs for the course. An example of the cost elements estimated by RCET is listed in Table 1-1. These are the same cost elements used in the Cost Analysis Program of the Army TRADOC Resource Management (ATRM) system.

1.3.1 Calculation of Course Costs

Costs for a new course are estimated by identifying a comparable existing course, obtaining cost data from this course from the ATRM system, and then modifying this data to reflect the differences in key resource requirements (for example, number of students and number of instructors) between the comparable course and the new course.

This procedure provides estimates of course costs that are (1) empirically based and (2) suitable for the types of high level analyses which are conducted during the early phases

Table 1-1. Example of Cost Elements Estimated by RCET.

PROPOSED COURSE SPREADSHEET

	OMA	MPA	PA	FHMA
DIRECT MISSION				
INSTRUCTIONAL DEPARTMENT				
FLYING HOUR				
OTHER				
SUBTOTAL				
TROOP SUPPORT				
P8				
P2/3				
AMMUNITION				
EQUIPMENT ITEM DEPRECIATION				
STUDENT PAY AND ALLOWANCES				
OFFICER				
ENLISTED				
TRAVEL PAY TO COURSE				
PER DIEM AT COURSE				
TOTAL DIRECT COSTS				
BASE OPERATIONS				
SUPPORT COSTS				
TRAINING AIDS				
OTHER				
TOTAL INDIRECT COSTS				
TOTAL DIRECT AND INDIRECT				
TOTAL COST PER GRADUATE				

of the acquisition process. A technical description of the algorithms used to estimate course cost is provided in Appendix A.

1.3.2 Calculation of Number of Instructors

The number of instructors required in a course is calculated by an automated version of the algorithm listed in the Staffing Guide for U.S. Army Service Schools (DA Pam 570-538). This algorithm is listed in Appendix A.

1.4 PROCEDURAL OVERVIEW

An overview of the procedures in the Resource and Cost Estimation Technique is provided in Figure 1-1.

The first step in the application of RCET is the identification of the "reference" course or the comparable existing course which most closely resembles the task and target population requirements of the new course. Procedures for identifying a reference course are contained in the ETES User's Guide. Once the reference course has been identified, cost data for this course are obtained from the Cost Analysis Program (MOS Training Cost) and entered into the SDT.

Reference course information is also used in the construction of the quasi-program of instruction (QPOI) for the new course. Included in the QPOI is a description of the methods to be used in each module in the course, and the student-instructor ratio and instructor contact hours

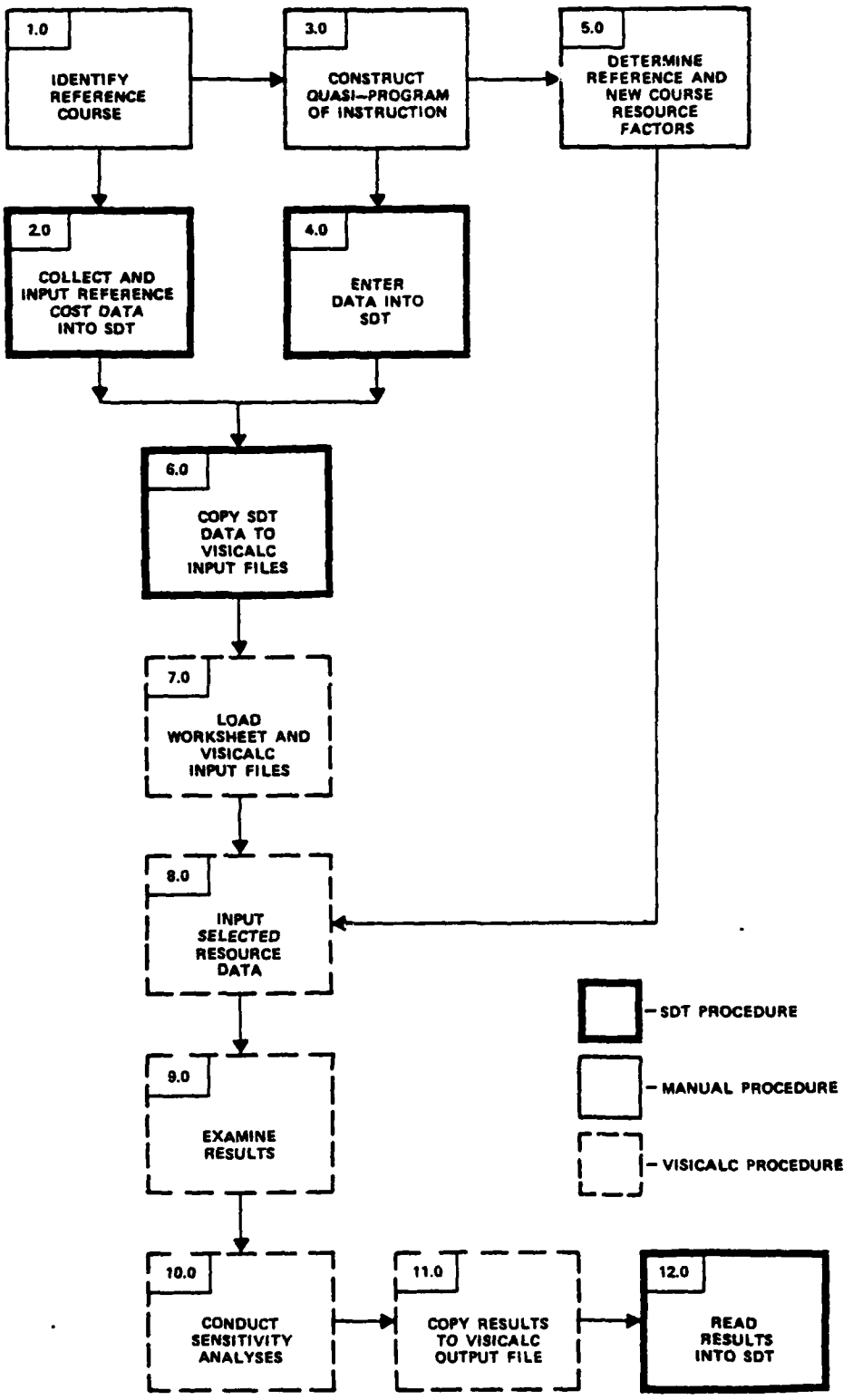

Figure 1-1. Overview of Procedures in Resource and Cost Estimation Technique (RCET).

associated with each method. Procedures for constructing a QPOI are contained in the ETES User's Guide. This same guide contains procedures for determining the number of students to be trained. This value is a critical factor in the determination of course costs.

Once the QPOI has been constructed for the new course, information from the QPOI on instructional methods, student/instructor ratios, and contact hours must be entered into the SDT. Once this is completed, the user must enter the SDT, enter the Applications mode, select the Resource and Cost Estimation Techniques (RCET), and copy the reference cost data and new course QPOI data onto files which can be read into the VISICALC program.

Once the VISICALC input files have been developed, the user must remove the SDT software diskette, put in the VISICALC software diskettes, and enter the VISICALC program.

Once into the VISICALC software, a few simple commands may be used to load the SDT input files and RCET worksheet into the VISICALC. When this is completed, a small, selected set of resource data for the reference and new course must be entered into the SDT. Course costs and instructor requirements are then calculated automatically.

After examining the initial estimates of course costs and instructor requirements, the user can use a few commands built into the RCET worksheet to conduct sensitivity analyses of key parameters. When these analyses are complete, the final set of costs for the new course can be copied onto a VISICALC output file. The user can then exit

the VISICALC software, enter the SDT software and copy the output file into the SDT data base.

1.5 OVERVIEW OF USER'S GUIDE

The remaining portion of this user's guide is divided into two sections. Section 2 describes the hardware and software that are required to use the program. Section 3 provides a detailed description of each of the twelve steps of the RCET. A technical description of the RCET algorithms and procedures is provided in Appendix A.

SECTION 2 - HARDWARE/SOFTWARE REQUIREMENTS

This section describes the hardware, software, and documentation needed to use the Resource and Cost Estimation Technique (RCET). This section is divided into three subsections. Section 2.1 describes the hardware required to use the RCET. Section 2.2 describes the software required to use the RCET. Section 2.3 describes the documentation that is required for successful application of the software.

2.1 HARDWARE REQUIREMENTS

To use the RCET Software, you must have an Apple III computer with:

- 128K Bytes of RAM memory.
- A video monitor. The monitor can be black and white or color. However, the program does not produce color images.
- A 5 megabyte Profile hard disk.
- An additional floppy disk drive (that is, over and above the disk drive built into your Apple III). This drive is needed to make a local floppy disk copy of an SDT data base, to load the System Description Technology (SDT) software which contains the SDT data base management system and

SDT-RCET interface software, and to run the VISICALC program.

- o A printer. A printer is needed to get hard copy output.

If you are using the Apple III for the first time, be sure to follow the APPLE III Owner's Guide for instructions on how to connect the computer, the monitor, and an extra floppy disk drive. Also, follow the manufacturer's instructions on how to connect your PROFILE hard disk to your system.

2.2 SOFTWARE REQUIREMENTS

To use RCET, you will need the following software:

- o SDT Program Diskettes. These diskettes contain software for both the SDT and the Media Selection Program.

- o SDT Boot Diskette - This diskette is used to boot (that is, activate) the SDT software.

- o SDT Backup Diskette (Optional) - These backup diskettes are used to make a local copy of an SDT data base.

In addition, to run the VISICALC portion of RCET, you will need the following:[1]

- VISICALC Loader Diskette
- VISICALC Program Diskette
- RCET Worksheet Diskette
- General Instructions for Handling Diskettes

To insert a diskette, open the disk drive and slip the diskette into the slot with the label facing upward. The edge of the diskette with the oval cutout should enter the drive first; the edge with the label should enter face up and last. Gently push the diskette into the drive; do not bend it. Close the drive door firmly.

To remove the diskette, open the door and pull the diskette straight out of the slot. If you leave the diskette in a drive for long periods of time without use, it is a good idea to open the door so the read/write head does not rest on the diskette. NEVER REMOVE A DISKETTE WHILE THE RED LIGHT UNDER THE DOOR IS ON. This can permanently damage the diskette and is almost certain to destroy the information on it. You may be able to reuse such a diskette, but you will not be able to recover the lost data.

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1 For information on obtaining SDT and RCET software, contact Dr. Lawrence O'Brien, Dynamics Research Corporation, 7 Lopez Road, Wilmington, MA 02187.

2.3 DOCUMENTATION REQUIREMENTS

To successfully use the software associated with RCET, it is recommended that you have the following documents on hand throughout your analyses.

- RCET User's Guide
- SDT User's Guide
- VISICALC Advanced Version Manual

The RCET User's Guide is not intended to be a substitute for the SDT User's Guide or the VISICALC Manual. It is also recommended that you have the ETES User's Guide on hand since many of the procedures for creating the input data for the RCET are contained in the ETES User's Guide.

SECTION 3 - RCET PROCEDURES

This section contains a detailed description of each of the RCET procedures. An overview of the RCET procedures is presented in Figure 3-1. More detailed descriptions of these procedures are provided in the sections which follow.

3.1 IDENTIFY REFERENCE COURSE

The reference course is the comparable existing course which most closely matches the task and target population requirements of the new course. Detailed procedures for identifying a reference course are described in Section 3.1.6 of the ETES User's Guide.

3.2 COLLECT AND INPUT REFERENCE COURSE DATA

Once the reference course is identified, cost data for this course must be obtained and entered into the SDT. Cost data for institutional courses is contained in the Cost Analysis Program - MOS Training Costs (RCS ATRM-159R1). Outputs from this program may be obtained from the Resource and Economic Analysis OPC, ATRM-R, in the DCS Resource Management-ATRM at TRADOC Headquarters.

An example output from this program is provided in Table 3-1. Once the cost data for the reference system is obtained, it must be entered into the SDT. To do this you must (1)

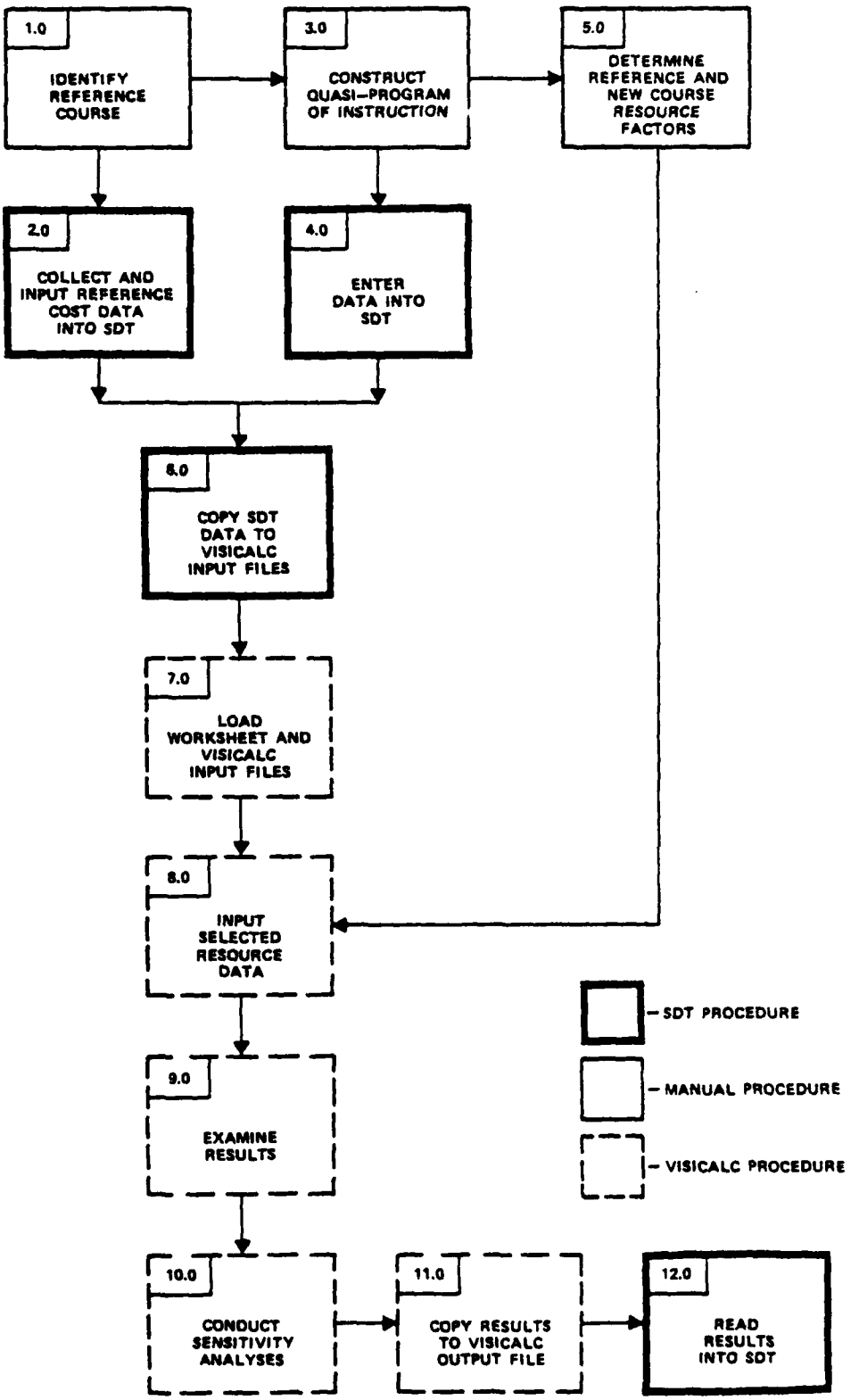

Figure 3-1 Overview of Procedures in Resource and Cost Estimation Technique (RCET).

load the SDT software, (2) enter the Input Mode of SDT, and (3) enter the cost data. More details on these three steps are provided in the sections which follow.

3.2.1 Load SDT Program

The software which contains the SDT program must be stored on your PROFILE hard disk.

If you have not already done so, you must load the SDT program into your hard disk, using the following procedures:

- Load the SDT Boot Disk into the built-in drive. Turn the computer off and then on again using the switch at back left of the Apple.

- Follow the instructions which appear on the screen, and load the SDT Program Diskettes into the additional floppy disk drive.

Once the SDT Program Diskettes have been loaded into your PROFILE hard disk, you will not have to enter the SDT Program Diskettes again.

3.2.2 Enter the Input Mode of SDT

To enter the Input Mode of the SDT you must perform actions on four SDT frames or menus.

Action 1: Examine SDT Introduction Frame (SDT-1)

The SDT introductory frame will appear on the screen after you have loaded the SDT Program Diskettes and SDT Boot Diskette. The frame will describe instructions for using SDT menus. Unlike many computer programs, you do not have to know a computer language to use the SDT. Instead, you can make commands and move through the program by selecting options from a series of menus.

To select a menu option, you must highlight it with the cursor and press the RETURN key.

You can move the cursor by hitting the up or down arrow keys. You actually select a highlighted option when you press the RETURN key.

Moving the cursor to a menu option causes no action to take place. To select a menu option, you must move the cursor to the option and press the RETURN key.

Some menus in the program may have so many items that not all of these items will fit on the screen at any one time (such menus will have the word more at the top and/or the bottom). To see these additional items, you must scroll the menu up or down. To scroll down, move to the bottom of the menu by hitting the down arrow key. Continue to hit this key and the menu will move up showing you the additional items in the menu. You can then scroll back up by hitting the up arrow key. After you have finished examining the instructions for using SDT menus, move the cursor to the option Skip to Start of Program, then hit RETURN.

Action 2: Select System (SDT-2)

If your data base is configured with more than 1 system, a menu will appear on the screen asking you to select the system to be examined. Move the cursor to the system you want to work with and hit RETURN. (See the SDT User's Guide for instructions on setting up an SDT data base for your weapon system.)

Action 3: Examine System Description (SDT-3)

A description of the data base you selected will appear on the screen. Read the description, then move the cursor to Continue and hit RETURN.

Action 4: Select SDT Mode of Operation (SDT-4)

A menu will appear on the screen asking you to select one of the seven SDT modes of operation. Move the cursor to Input and hit RETURN.

3.2.3 Enter Data into SDT

Once in the Input Mode, there are five actions you must perform to enter cost data for reference courses.

Action 1: Select Input Entity (I-1)

A menu will come on the screen asking you to select one of the seven entities in the SDT for data input. Move the cursor to the entity Courses and hit RETURN.

Action 2: Select Input Mode (I-2)

A frame will appear on the screen asking you to select which SDT input mode you would like to use. Move the cursor to Create New Courses and hit RETURN.

Action 3: Select Course Attributes (I-3)

A menu will appear on the screen asking you to select the attributes to be input. Move the cursor to Course Costs and hit RETURN. Finally, move the cursor to No More Attributes and hit RETURN.

Action 4: Select Course Costs (I-3)

A message will appear on the screen asking you to select the course costs attributes you would like to enter. Move the cursor to All Attributes, hit RETURN, then move the cursor to No More Attributes and hit RETURN.

Action 5: Enter Data (I-6)

Frames will appear on the screen asking you to enter course titles and cost data. Enter this information for each reference course you have identified. When you have entered all the information for the last reference course you wish to enter, abort the entry of course cost data by making no entry on the space provided for course title, and then selecting the option for aborting course input.

More detailed descriptions of procedures for entering data into the SDT are described in the SDT User's Guide.

3.3 CONSTRUCT QUASI-PROGRAM OF INSTRUCTION

If you have not already done so, you must construct a quasi program of instruction for the new course. Procedures for constructing a quasi program of instruction are contained in Section 3.1.6 of the ETES User's Guide. Tables 3-2 and 3-3 display the information contained in a QPOI. Information included in Part 1 of the QPOI (methods, contact hours) is particularly crucial since it is used directly in the calculation of the number of instructors in the RCET.

3.4 ENTER DATA INTO SDT

To enter the data on methods and contact hours into the SDT you must (1) enter the Input Mode of the SDT and (2) enter the data on instructional methods and contact hours. Procedures for entering the Input Mode of the SDT are described in Section 3.2.1. Once in the Input Mode, four actions are required to enter data on methods and contact hours.

Action 1: Select Input Entity (I-1)

A menu will come on the screen asking you to select one of the seven entities in the SDT for data input. Move the cursor to the entity Courses and hit RETURN.

Action 2: Select Input Mode (I-2)

A frame will appear on the screen asking you to select which SDT input mode you would like to use. Assuming that you have already entered the new courses, move the cursor to Add

Table 3-2.
QUASI POI (PART 1)

COURSE NUMBER:
TITLE:
COURSE LENGTH:

MODULE	METH-1	S/I	ICH	METH-2	S/I	ICH	METH-3	S/I	ICH
------	------	---	---	------	---	---	------	---	---

Table 3-3

QUASI POI (PART 2)

COURSE NUMBER:
TITLE:

MODULE	TASK
------	----

Attributes Giving Me Option When Already Present and hit RETURN (see SDT User's Guide for more detailed instructions on input modes).

Action 3: Select Input Format (I-7)

This frame will allow you to select an input/output format to guide your input, thereby avoiding the task of selecting the attributes to be entered. Move the cursor to QPOI-Part 1 and hit RETURN.

Action 4: Enter Data (I-6)

Frames will come on the screen asking you to enter information on course module titles, instructional methods, student/instructor ratios, and contact hours. Enter this information for each new course you have identified. When you have entered all the information for the last reference course you wish to enter, abort the entry of course data by making no entry on the space provided for module title and then selecting the option for aborting course input.

3.5 DETERMINE REFERENCE AND NEW COURSE RESOURCE FACTORS

During this step, eight items of training resource information must be identified: (1) number of graduates required per year for the new courses for both steady-state and phased years, (2) the expected attrition rates for the new course, (3) the class size and the total nonacademic hours for the new course, (4) the number of norm graduates per year for the most recent year of the reference course, (5) the total number of instructor contact hours for the

most recent year of the reference course, (6) the course length of the reference course, and (7) selected student/instructor ratios for the new course. For the new course Table 3-4 displays a worksheet that can be used to document this information. Procedures for developing these six training resource elements are provided in the sections which follow.

3.5.1 Determination of Number of Graduates for New Course

Algorithms for calculating the number of students to be trained are described in Section 3.2.2 of the ETES User's Guide. Algorithms are provided for both the steady-state and phased situations.

3.5.2 Determination of Attrition Rate for New Course

Procedures for determining attrition rates for the new course are listed in Section 3.2.1 of the ETES User's Guide.

3.5.3 Determination of Optimum Class Size and Nonacademic Hours for New Course

Optimum class size and nonacademic hours for the new course are determined in a two step process. First, the optimum class size for the reference course is obtained from the Manpower Staffing Standards System available from the Resource and Economic Analysis, OPC ATRM in the DCS Resource Management-ATRM at TRADOC Headquarters and information on the nonacademic hours for the reference course is obtained

Table 3-4. Input Data Worksheet for Resource Information (RME).

Number of Graduates Required

(a) Steady State	(b) Phased Requirements FY _____	FY _____	FY _____	FY _____	_____
_____	_____	_____	_____	_____	_____

Resource Parameters

Parameter Name	New Course	Reference Course
(c) number of grads required	----------	
(d) expected course attrition	----------	
(e) number of norm graduates		----------
(f) instructor contact hours per year		----------
(g) course frequency		
(h) course length (in days)	----------	----------
(i) class size	----------	
(j) non-academic hours	----------	

(k) Student/Instructor Ratios

Method Name	Student/Instructor Ratio	
Audio Tape	20	----------
Conference/Lecture	N/A	----------
Computer Assisted Instruction	20	----------
Case Study	20	----------
Demonstration	20	----------
Dual Flight Hours	N/A	----------
Hardware Performance Examination	6	----------
Nonhardware Performance Examination	6	----------
Nonhardware Performance Examination	N/A	----------
Elective	N/A	----------
Film	N/A	----------
Guest Speaker	N/A	----------
Independent Study	----------	
Non-contact w/Instructor in Classroom	N/A	----------
Non-contact w/o Instructor Available	N/A	----------
Hardware Oriented Practical Application	6	----------
Non-hardware Practical Application	6	----------
Classroom Practical Application	20	----------
Programmed Instruction (using text)	20	----------
Printed Materials	20	----------
Besseler Cue See	20	----------
Seminar	20	----------
Solo Flight Hours	N/A	----------
Simulation Instructions	----------	
Self-Paced Instruction	20	----------
Slide Tape	20	----------
Television	N/A	----------
Instructor Led Work Group	----------	
Student Led Work Group	----------	

Table 3-5. Example Output From Manpower Staffing Standards.

TRAINING COURSE DATA

SCHOOL: INTELLIGENCE
LOCATION: FT. DEVENS

CAT FILE NAME: INTELDV1
AS OF DATE: 1 JUN 84

CSE TYPE	COURSE NO	COURSE TITLE	ONE-TIME ICH	OPT CLASS SIZE	CSE-LG IN-WKS	LINE NO
06	102-33S10	EW/INTCPT SYSTEM REPAIR	2181.50	10	36.4	1
06	231-05D10	EW/SIGINT EMITTER IDENT/LOCATOR	1883.50	12	27.8	2
06	231-05G10	SIGNAL SECURITY SP CRS	1272.50	15	17.6	3
06	233-98J10	EW/SIGINT NONCOM COLLECTOR BT/AIT	978.25	12	14.4	4
06	231-05H10/20(RC)	ELECT WARFARE/SIGNIT MORSE INTERCEPTOR	536.00	45	0.0	5
06	231-05G10/20(RC)	SIG SECURITY SPEC **	260.20	15	0.0	6
06SP	231-05H10	EW/SIGINT MORSE COLLECTOR	2039.50	21	23.8	7
07	102-33S30	EW/INTCPT SYSTEM REPAIR BTC	1960.00	6	18.6	8
07	231-05D30	EW/SIGINT EMIT ID/LOCATOR BTC *	395.00	6	12.0	9
07	231-05G30	SIGNAL SECURITY SP BTC *	278.00	5	7.2	10
07	231-05H30	EW/SIGINT MORSE INTERCEPTOR BTC *	68.20	10	5.0	11
07	231-05K30	EW/SIGINT NON-MORSE INTERCEPT BTC *	166.50	12	6.8	12
07	232-98C30	EW/SIG TRAFFIC ANALYST *	223.00	20	7.8	13
07	232-98G3LGM	EW/SIGINT VOICE INTCPT(GERMAN BTC) *	118.00	6	6.8	14
07	232-98G3LRU	VOICE INTERCEPT RUSSIAN BTC *	118.00	6	6.8	15
07	232-98G3LXX	EW/SIGINT VOICE INTERCEPT BTC *	118.00	6	6.8	16
07	233-98J30	EW/SIGINT NONCOM INTERCEPT ANALYST BTC	382.00	8	9.2	17
07	NONE	BTC COMMON CORE (ELECTRONICS)	187.00	30	0.0	18
07	233-98J10/20(RC)	ELECT WARFARE/SIGNIT NON-COM COLLECTOR	194.00	9	0.0	19
07	232-98C10/20(RC)	ELECT WARFARE/SIGNIT ANALYST **	159.00	25	0.0	20
07	232-F(R..)	ELECT WF/SIGNIT MSN TNG EURO RC **	81.00	0	0.0	21
08	102-ASIS6	DGTL CNVRTNG PROG GP MAINT(AN/TCA)	347.50	4	8.6	22
08	102-ASIC7	TACT CM REC SYS MAINT (AN/MLQ-24)	209.00	4	7.8	23
08	102-F18	REMOTE CON SYS MAINT (AN/URR66)	338.50	4	11.8	24
08	102-ASID4	DATA ACQ SYSTEM MAINT(AN/GSQ-76)	422.00	6	8.8	25
08	102-ASIC6	ELECT CM REC SYSTEM MAINT(AN/TLQ-17)	195.00	6	7.2	26
08	102-ASIQ4	ENVRMNTL COL SYSTEM MAINT(AN/GSR-4)	239.00	2	8.4	27
08	102-F33	AUTO HF/DF OUTSTATION PROC UNIT	264.00	5	5.4	28
08	102-F46	EW/INTCPT SYSTEM MAINT QUICK LOOK II	665.00	4	14.2	29
08	102-F47	AN/MSQ-103 TEAMPACK INTERMED	569.75	4	13.2	30
08	102-F48	TEAM PACK (AN/MSQ-103) ORG MAINT TNG	84.00	4	2.2	31
08	102-F49	AN/TSQ-114 ORG MAINTENANCE	190.00	4	4.0	32
08	102-F50	AN/TSQ-114 INTER DS/GS MAINTENANCE	595.25	4	12.0	33
08	102-F51	TIME SIGNAL SET MAINT (AN/GSQ-53A)	84.00	4	3.4	34
08	102-ASIN1	GUARDRAIL V MAINTENANCE COURSE	498.00	8	8.0	35
08	231-F7	ADVANCED IDENT TECH(AIT) ANALYST CRS	216.00	6	3.8	36
08	231-ASIK9	EW/SIGINT INTERCEPT VHF/UHF OPERATIONS	131.00	12	3.2	37
08	231-F12	ARMY UNIQ VOICE INTERCEPT-RU	289.60	10	5.2	38
08	231-F13	DUAL PURPOSE MISSION TRAINING (OSH)	93.00	10	2.0	39
08	231-F14	ARMY UNIQUE VOICE INTERCEPT-GERMAN	195.10	10	3.8	40
08	231-F15	AN/TSQ-114 TRAILBLAZER OPERATOR CRS I	117.40	4	2.4	41
08	231-F16	AN/TSQ-114 TRAILBLAZER OPERATOR CRS II	122.15	4	2.4	42
08	231-F17(CM)	ARMY UNIQUE VOICE INTERCEPT TNG (CM)	152.50	10	3.0	43
08	231-F18(KP)	ARMY UNIQUE VOICE INTERCEPT TRG(KP)	82.00	12	12.8	44
08	231-F19(LA)	ARMY UNIQUE VOICE INTERCEPT TNG(LA)	166.30	10	3.2	45
08	231-F22(CX)	ARMY UNIQUE VOICE INTERCEPT TNG (CX)	135.60	10	2.8	46
08	232-F3	ARMY UNIQUE ANALYSIS TNG CRS (AREA 1/2)	274.50	15	4.2	47
08	232-F4	ARMY UNIQUE ANALYSIS TNG CRS (AREA 3/4)	274.50	20	4.2	48

Table 3-5 (continued)

TRAINING COURSE DATA

SCHOOL: INTELLIGENCE
LOCATION: FT. DEVENS

CAT FILE NAME: INTELDV1
AS OF DATE: 1 JUN 84

CSE TYPE	COURSE NO	COURSE TITLE	ONE-TIME ICH	OPT CLASS SIZE	CSE-LG IN-WKS	LINE NO
06	102-33S10	EW/INTCPT SYSTEM REPAIR	2181.50	10	48.4	1
06	231-05D10	EW/SIGINT EMITTER IDENT/LOCATOR	1883.50	12	27.8	2
06	231-05G10	SIGNAL SECURITY SP CRS	1272.50	15	17.6	3
06	233-98J10	EW/SIGINT NONCOM COLLECTOR BT/AIT	978.25	12	14.4	4
06	231-05H10/20(RC)	ELECT WARFARE/SIGNIT MORSE INTERCEPTOR	536.00	45	0.0	5
06	231-05G10/20(RC)	SIG SECURITY SPEC **	260.20	15	0.0	6
06SP	231-05H10	EW/SIGINT MORSE COLLECTOR	2039.50	21	23.8	7
07	102-33S30	EW/INTCPT SYSTEM REPAIR BTC	1960.00	6	18.6	8
07	231-05D30	EW/SIGINT EMIT ID/LOCATOR BTC *	395.00	6	12.0	9
07	231-05G30	SIGNAL SECURITY SP BTC *	278.00	5	7.2	10
07	231-05H30	EW/SIGINT MORSE INTERCEPTOR BTC *	68.20	10	5.0	11
07	231-05K30	EW/SIGINT NON-MORSE INTERCEPT BTC *	166.50	12	6.8	12
07	232-98C30	EW/SIG TRAFFIC ANALYST *	223.00	20	7.8	13
07	232-98G3LGM	EW/SIGINT VOICE INTCPT(GERMAN BTC) *	118.00	6	6.8	14
07	232-98G3LRU	VOICE INTERCEPT RUSSIAN BTC *	118.00	6	6.8	15
07	232-98G.LXX	EW/SIGINT VOICE INTERCEPT BTC *	118.00	6	6.8	16
07	233-98J30	EW/SIGINT NONCOM INTERCEPT ANALYST BTC	382.00	8	9.2	17
07	NONE	BTC COMMON CORE (ELECTRONICS)	187.00	30	0.0	18
07	233-98J10/20(RC)	ELECT WARFARE/SIGNIT NON-COM COLLECTOR	194.00	9	0.0	19
07	232-98C10/20(RC)	ELECT WARFARE/SIGNIT ANALYST **	159.00	25	0.0	20
07	232-F(RC)	ELECT WF/SIGNIT MSN TNG EURO RC **	81.00	0	0.0	21
08	102-ASIS6	DGTL CNVRTNG PROG GP MAINT(AN/TCA)	347.50	4	8.6	22
08	102-ASIC7	TACT CM REC SYS MAINT (AN/MLQ-24)	209.00	4	7.8	23
08	102-F18	REMOTE CON SYS MAINT (AN/URR66)	338.50	4	11.8	24
08	102-ASID4	DATA ACQ SYSTEM MAINT(AN/GSQ-76)	422.00	6	8.8	25
08	102-ASIC6	ELECT CM REC SYSTEM MAINT(AN/TLQ-17)	195.00	6	7.2	26
08	102-ASIQ4	ENVRMNTL COL SYSTEM MAINT(AN/GSR-4)	239.00	2	8.4	27
08	102-F33	AUTO HF/DF OUTSTATION PROC UNIT	264.00	5	5.4	28
08	102-F46	EW/INTCPT SYSTEM MAINT QUICK LOOK II	665.00	4	14.2	29
08	102-F47	AN/MSQ-103 TEAMPACK INTERMED	569.75	4	13.2	30
08	102-F48	TEAM PACK (AN/MSQ-103) ORG MAINT TNG	84.00	4	2.2	31
08	102-F49	AN/TSQ-114 ORG MAINTENANCE	190.00	4	4.0	32
08	102-F50	AN/TSQ-114 INTER DS/GS MAINTENANCE	595.25	4	12.0	33
08	102-F51	TIME SIGNAL SET MAINT (AN/GSQ-53A)	84.00	4	3.4	34
08	102-ASIN1	GUARDRAIL V MAINTENANCE COURSE	498.00	8	8.0	35
08	231-F7	ADVANCED IDENT TECH(AIT) ANALYST CRS	216.00	6	3.8	36
08	231-ASIK9	EW/SIGINT INTERCEPT VHF/UHF OPERATIONS	131.00	12	3.2	37
08	231-F12	ARMY UNIQ VOICE INTERCEPT-RU	289.60	10	5.2	38
08	231-F13	DUAL PURPOSE MISSION TRAINING (OSH)	93.00	10	2.0	39
08	231-F14	ARMY UNIQUE VOICE INTERCEPT-GERMAN	195.10	10	3.8	40
08	231-F15	AN/TSQ-114 TRAILBLAZER OPERATOR CRS I	117.40	4	2.4	41
08	231-F16	AN/TSQ-114 TRAILBLAZER OPERATOR CRS II	122.15	4	2.4	42
08	231-F17(CM)	ARMY UNIQUE VOICE INTERCEPT TNG (CM)	152.50	10	3.0	43
08	231-F18(KP)	ARMY UNIQUE VOICE INTERCEPT TRG(KP)	82.00	12	12.8	44
08	231-F19(LA)	ARMY UNIQUE VOICE INTERCEPT TNG(LA)	166.30	10	3.2	45
08	231-F22(CX)	ARMY UNIQUE VOICE INTERCEPT TNG (CX)	135.60	10	2.8	46
08	232-F3	ARMY UNIQUE ANALYSIS TNG CRS (AREA 1/2)	274.50	15	4.2	47
08	232-F4	ARMY UNIQUE ANALYSIS TNG CRS (AREA 3/4)	274.50	20	4.2	48

from the program of instruction for that course. An example output from the ATRM system is displayed in Table 3-5. Second, the class size and nonacademic hours for the reference course is reviewed and modified to reflect the differences in content and method between the reference course and the new course.

3.5.4 Determination of Number of Norm Graduates for Reference Course

The number of norm graduates for an existing course can be obtained directly from the Cost Analysis Program which is available from the Resource and Economic Analyses, OPC ATRR-R in the DCS Resource Management-ATCM at TRADOC headquarters. Example output from this program is provided in Table 3-1.

3.5.5 Determination of Instructor Contact Hours for Reference Course

The total number of instructor contact hours for the reference course can be obtained directly from Manpower Staffing System maintained by the Resource and Cost Analysis OPC, ATRM-R in the DCS Resource Management - ATRM at TRADOC headquarters (see Table 3-5).

3.5.6 Determination of Course Length for Reference Course

Course length for an existing course is available from a variety of sources including the POI for the course and the Cost Analysis Program (see Table 3-1 for example output).

Table 3-1. Example Output From Cost Analysis

04 RCS AIRM-359(R1)

FY 1980 COST PER GRADUATE (FY 82 $)

COURSE TITLE BASIC NCO/COMBAT ARMS (4.0 WEEKS)

(17.0 NORM GRAD)

COURSE NUMBER/MOS 62DA-BLISS

DIRECT COSTS	OMA	MPA	PA	FHMA
1. DIRECT MISSION				
A. INSTRUCTIONAL DEPT	138	3,651		
B. FLYING HOUR				
C. OTHER	282	579		
D. SUBTOTAL	420	4,230		
2. TROOP SUPPORT				
A. PB				
B. P2/3				
3. AMMUNITION				
4. EQUIP ITEM DEPR				
5. STUDENT PAY & ALWS				
A. OFFICER ( )				
B. ENLISTED (E-5)		1,290		
6. TRAVEL PAY TO COURSE	289			
7. PER DIEM AT COURSE	210			
8. TOTAL DIRECT COSTS	919	5,520		
INDIRECT COSTS				
9. BASE OPERATIONS	1,075	209		
10. SUPPORT COSTS				
A. TRAINING AIDS	16	2		
C. OTHER	221	180		60
11. TOTAL INDIRECT COSTS	1,312	391		60
12. TOTAL DIRECT & INDIRECT	2,231	5,911		60
13. TOTAL COST PER GRADUATE $	8,202			
FIXED & VARIABLE COSTS				
14. DIRECT MISSION				
A. FIXED	294	3,469		
B. VARIABLE	126	761		
15. TOTAL DIRECT & INDIRECT				
A. FIXED	1,055	3,685		60
B. VARIABLE	1,176	2,226		

3.5.7 Determination of Student/Instructor Ratios

Table 3-f displays the common instructional methods used in institutional Army training courses and the student/instructor ratios which are specified for these methods in TRADOC Cir 351-12, Format for Program of Instruction. As Table 3-6 indicates, student/instructor ratios for some methods are determined by an appraisal at the local school. During this step, student/instructor ratios for the methods without standardized ratios must be determined. (Student/Instructor ratios for the other methods are built into the program.) To determine student/instructor ratios for these methods, comparable existing courses at the school where the new course will be taught should be identified and the ratios used in these courses should then be used for the new course. Of course, if the local school has its own standardized ratios for these methods, these ratios should be used.

3.6 COPY SDT DATA TO VISICALC INPUT FILES

To copy the SDT data to VISICALC input files, you must (1) enter the applications mode of the SDT and (2) apply the RCET applications software. More details on these two procedures are provided in the steps which follow.

3.6.1 Enter Applications Mode of SDT

To enter the applications mode of the SDT, you must perform actions in four SDT frames or menus.

Action 1: Introductory Frame (SDT-1)

This frame introduces you to the SDT. Move the cursor to Continue with Program and hit RETURN.

TABLE 3-6 METHODS OF INSTRUCTION AND ASSOCIATED STUDENT/INSTRUCTOR RATIOS

AT	Audio Tape	20:1
C	Conference/Lecture	1 per class
CAI	Computer Assisted Instruction	20:1
CS	Case Study	20:1
D	Demonstration	20:1
DF	Dual Flight Hours (Only Aviator Courses)	-
E1	Hardware Performance Examination	6:1
E2	Nonhardware Performance Examination	6:1
E3	Nonhardware Performance Examination	1 per class
EL	Elective (In-House Only, Except for CGSC)	1 per class
F	Film	1 per class
GS	Guest Speaker	1 per class
IS	Independent Study	Local Appraisal
NC1	Non-contact Instruction with an Instructor Available in Classroom	-
NC2	Non-contact Instruction without an Instructor Available	-
PE1	Hardware Oriented (Hands-On) Practical Application	6:1
PE2	Hardware Oriented (Non-Classroom) Practical Application	6:1
PE3	Classroom Practical Application	20:1
PI	Programmed Instruction (Using Programmed Text)	20:1
PM	Printed Materials	20:1
QC	Besseler Cue See	20:1
S	Seminar	20:1
SF	Solo Flight Hours (Only Aviator Courses)	-
SI	Simulation Instruction	Local Appraisal
SP	Self-Paced Instruction	20:1
ST	Slide Tape	20:1
TV	Television	1 per class
WC1	Instructor Led Work Group	Local Appraisal
WC2	Student Led Work Group	Local Appraisal

Sources:

TRADOC Cir 351-12
Format for Programs of Instruction

Action 2: Select System (SDT-2)

If your data base is configured with more than 1 system, a menu will appear on the screen asking you to select the system to be examined. Move the cursor to the system you want to work with and hit RETURN. (See the SDT User's Guide for instructions on setting up an SDT data base for your weapon system.)

Action 3: Examine System Description (SDT-3)

A description of the data base you selected will appear on the screen. Read the description, then move the cursor to Continue and hit RETURN.

Action 4: Select SDT Mode of Operation (SDT-4)

A menu will appear on the screen asking you to select one of the seven SDT modes of operation. Move the cursor to Applications and hit RETURN.

Action 5: Select RCET (AP-1)

A menu will appear on the screen asking you to select which applications program you would like to apply. Move the cursor to Resource and Cost Estimation Program and hit RETURN.

3.6.2 Apply RCET Applications Software

Copying SDT data to a VISICALC input file requires actions on four RCET menus or frames. An overview of the logic

among the RCET applications software is contained in Appendix B.

Action 1: Select Option (RC-1)

A menu will appear on the screen asking you to select from two options for either (1) copying data to VISICALC input file, or (2) copying VISICALC results to SDT (see Figure 3-2). Move the cursor to Copy Resource and Cost Data to VISICALC Input File and hit RETURN.

Action 2: Select Reference Course (RC-2)

A menu will appear on the screen asking you to select a reference course (see figure 3-3). Move the cursor to the desired course and hit RETURN. If all of the courses cannot fit on the screen at once, the word more will be listed on the bottom of the screen. To view the additional courses, scroll the screen up by hitting the down arrow key. You can scroll down by hitting the up arrow key.

Action 3: Select New Course (RC-3)

A menu will appear on the screen asking you to select a new course (see Figure 3-4). Move the cursor to the desired course and hit RETURN. If all of the courses cannot fit on the screen at once the word more will be listed on the bottom of the screen. To view these additional courses, scroll the screen up by hitting the down arrow key. You can scroll down by hitting the up arrow key.

RESOURCE AND COST ESTIMATION TECHNIQUE

SELECT OPTION

- TERMINATE SESSION
- RETURN TO SDT
- ANOTHER APPLICATIONS PROGRAM
- COPY RESOURCE AND COST DATA TO VISICALC INPUT FILE
- COPY VISICALC RESULTS TO SDT

Figure 3-2. Select Option (RC-1).

RESOURCE AND COST ESTIMATION TECHNIQUE

SELECT REFERENCE COURSE

ABORT

COURSE X

COURSE Y

COURSE Z

COURSE A

COURSE B

Figure 3-3. Select Reference Course (RC-3).

RESOURCE AND COST ESTIMATION TECHNIQUE

REFERENCE COURSE	SELECT NEW COURSE
- COURSE X	- ABORT
- COURSE Y	- COURSE X
- COURSE Z	- COURSE Y
- COURSE A	- COURSE A
- COURSE B	- COURSE B

TRANSFERRING DATA TO VISICALC

Figure 3-4. Select New Course (RC-3).

Action 4: Completed Copy (RC-3)

At this point, the program will copy cost data from the reference course and QPOI data (methods and contact hours) from the new course to VISICALC input files. When these files have been completely copied, the message listed in Figure 3-5 should appear on the screen. However, if there is cost data missing for the reference course, you will get the message listed in Figure 3-6, before the copy complete message and if there is QPOI data missing for the new course, you will get the message listed in Figure 3-7 before the copy complete message. If you have data missing, you should either, (1) terminate your session or (2) return to the Select Applications Program menu where you can exit back to the SDT and examine and/or analyze the data for the courses.

Once you obtain the message listed in Figure 3-5 indicating that you have successfully created the VISICALC input files, you must remove the SDT Boot Diskette and insert the VISICALC Loader Diskette and Program Diskette. More details for using the VISICALC software are provided in the next section.

3.7 LOAD WORKSHEET AND VISICALC INPUT FILES

To load the RCET worksheet and input files generated by the SDT into VISICALC you must (1) insert the VISICALC diskettes, (2) load the RCET worksheet into memory, and (3) load the reference course cost and new course methods and contact hour files into memory. More details on these three steps are provided in the sections which follow.

RESOURCE AND COST ESTIMATION TECHNIQUE

DATA SUCCESSFULLY COPIED TO VISICALC FILES. REMOVE SDT BOOT DISKETTE FROM BUILT-IN DRIVE AND INSERT VISICALC LOADER DISKETTE. CONSULT RESOURCE AND COST ESTIMATION TECHNIQUE USER'S GUIDE FOR FURTHER DIRECTIONS.

PRESS RETURN TO CONTINUE.

Figure 3-5. Completed Copy to VISICALC (RC-5).

SOME DATA MISSING FROM REFERENCE COURSE.

DATA SUCCESSFULLY COPIED TO VISICALC FILES. REMOVE SDT BOOK DISKETTE FROM BUILT-IN DRIVE AND INSERT VISICALC LOADER DISKETTE 1. CONSULT RESOURCE AND COST ESTIMATION TECHNIQUE USER'S GUIDE FOR FURTHER DIRECTIONS.

PRESS RETURN TO CONTINUE.

Figure 3-6. Missing Data On Reference Course Costs (RC-7).

NO METHOD HOURS IN SDT FILE FOR SELECTED NEW COURSE.

DATA SUCCESSFULLY COPIED TO VISICALC FILES. REMOVE SDT BOOT DISKETTE FROM BUILT-IN DRIVE AND INSERT VISICALC LOADER DISKETTE 1. CONSULT RESOURCE AND COST ESTIMATION TECHNIQUE USER'S GUIDE FOR FURTHER DIRECTIONS.

PRESS RETURN TO CONTINUE.

Figure 3-7. Missing Data On New Course Methods (RC-6).

3.7.1 Inserting VISICALC Diskettes

To insert the diskettes needed to run the RCET worksheet in the VISICALC, you must perform the following:

- Turn the computer off.
- Load the VISICALC Loader Diskette into your built-in disk drive.
- Load the VISICALC Program Diskette into your external disk drive.
- Turn the computer on. At this point, the VISICALC copyright information should appear on the screen indicating that you have successfully entered the VISICALC program software.

3.7.2 Load RCET Worksheet

To load the RCET worksheet, you must perform the following:

- Remove the VISICALC Loader Diskette from the built-in drive and insert the RCET worksheet diskette.
- Hit the following keys:
  - /
  - S
  - L
  - →
  - Return

At this point, the upper left hand portion of the RCET worksheet should appear on your screen.

3.7.3 Load Input Files

To load the files containing information on the reference course costs, new course methods, and contact hours you must do the following:

- While holding the CONTROL key down, press the K key,
- Then, hit the L key.

At this point, the input files will be loaded from your PROFILE into the VISICALC program. It will take 10 to 50 seconds for this loading to be completed. When the loading is complete, the cursor (or highlighted area) will be highlighting the first data element in the student/instructor ratio column which requires input. These data elements will be indicated by an underline ___ (See Figure 3-8).

3.8 INPUT SELECTED RESOURCE DATA

Before calculating course costs and number of instructors you must enter data on (1) student instructor ratios for those methods which do not have a standard student/instructor ratio, and (2) additional resource data on number of graduates required per year for the new course, the

Figure 3-8. RCET Worksheet

INSTRUCTOR CONTACT HOURS SECTION

METHOD NAME	TOTAL HRS	STUDENT/INSTR RATIO
Audio Tape	0	20
Conference/Lecture	0	N/A
Computer Assisted Instruction	0	20
Case Study	0	20
Demonstration	0	20
Dual Flight Hours	0	N/A
Hardware Performance Examination	0	6
Nonhardware Performance Examination	0	6
Nonhardware Performance Examination	0	N/A
Elective	0	N/A
Film	0	N/A
Guest Speaker	0	N/A
Independent Study	0	_____
Non-contact w/ Instructor in Classroom	0	N/A
Non-contact w/o Instructor Available	0	N/A
Hardware Oriented Practical Application	0	6
Non-hardware Practical Application	0	6
Classroom Practical Application	0	20
Programmed Instruction (using text)	0	20
Printed Materials	0	20
Besseler Cue See	0	20
Seminar	0	20
Solo Flight Hours	0	N/A
Simulation Instruction	0	_____
Self-Paced Instruction	0	20
Slide Tape	0	20
Television	0	N/A
Instructor Led Work Group	0	_____
Student Led Work Group	0	_____

Figure 3-8. (continued)

RESOURCE PARAMETERS SECTION

PARAMETER NAME	PROPOSED COURSE	REFERENCE COURSE
number of grads required	_____	
expected course attrition	_____	
number of norm graduates		_____
instructor contact hours per year		_____
course frequency		
course length (in days)		_____
class size	_____	
number of instructors		
administrative hours/course	_____	

Figure 3-8. (continued)

REFERENCE COURSE SPREADSHEET	UMA	MPA	PA	FHMA
DIRECT MISSION				
INSTRUCTIONAL DEPARTMENT	_____	_____		
FLYING HOUR	_____	_____		
OTHER	_____	_____		
SUBTOTAL				
TROOP SUPPORT				
FD	_____	_____	_____	
P2/3	_____	_____	_____	
AMMUNITION			_____	
EQUIPMENT ITEM DEPRECIATION			_____	
STUDENT PAY AND ALLOWANCES				
OFFICER		_____		
ENLISTED		_____		
TRAVEL PAY TO COURSE	_____	_____		
PER DIEM AT COURSE	_____			
TOTAL DIRECT COSTS				
BASE OPERATIONS	_____	_____		
SUPPORT COSTS				
TRAINING AIDS	_____	_____		
OTHER	_____			_____
TOTAL INDIRECT COSTS				
TOTAL DIRECT AND INDIRECT				
TOTAL COST PER GRADUATE				
DIRECT MISSION				
FIXED	_____	_____		
VARIABLE	_____	_____		
TOTAL DIRECT AND INDIRECT				
FIXED	_____	_____		
VARIABLE	_____	_____		

Figure 3-8. (continued)

PROPOSED COURSE SPREADSHEET

	OMA	MPA	PA	FHMA
DIRECT MISSION				
INSTRUCTIONAL DEPARTMENT				
FLYING HOUR				
OTHER				
SUBTOTAL				
TROOP SUPPORT				
P8				
P2/3				
AMMUNITION				
EQUIPMENT ITEM DEPRECIATION				
STUDENT PAY AND ALLOWANCES				
OFFICER				
ENLISTED				
TRAVEL PAY TO COURSE				
PER DIEM AT COURSE				
TOTAL DIRECT COSTS				
BASE OPERATIONS				
SUPPORT COSTS				
TRAINING AIDS				
OTHER				
TOTAL INDIRECT COSTS				
TOTAL DIRECT AND INDIRECT				
TOTAL COST PER GRADUATE				

expected attrition rate for the new course, the class size for the new course, the number of norm graduates per year for the most recent year of the new reference course, the total number of instructor contact hours for the most recent year of the reference course, and the course length for the reference course. This information should have been generated by the procedures described in Section 3.5 and should have been documented in the worksheet listed in Table 3-4. During this procedure, you should be simply entering this data into VISICALC. More details on entering these two sets of data are provided in the sections which follow.

3.8.1 Enter Student/Instructor Ratios

Student/Instructor ratios must be entered for those methods which do not have standard student instructor ratios. These methods will be indicated by an underline _____ in the student/instructor ratio column in the worksheet (see Figure 3-8).

To enter these ratios, move the cursor to the appropriate row in the student/instructor ratio column, enter the student/instructor ratio, and hit the Return key. You can move the cursor in VISICALC by hitting the up, down, left and right arrow keys. You should enter ratios for all methods which have an underlined space in the student/instructor ratio column. Even if the course you are estimating does not use a method, you must still enter a student/instructor ratio for that method. In the latter case, you should enter a ratio of one. (The program will later ignore this method. This avoids an error caused by division by zero later in the program.)

If you make a mistake and you notice it before hitting the Return key you can correct it by hitting the Escape key and then typing in the corrected number. If you make a mistake and you notice it after hitting Return, you can correct it by moving the cursor back to the item and retyping in your answer.

3.8.2 Enter Other Resource Data

To enter the remaining resource data you must move to the Resource Parameters section of the worksheet. To do this, hit the right and up arrow keys until you reach this section. Then enter the remaining resource data in the spaces provided on the RCET worksheet. This information should be obtained directly from the input data worksheet listed in Table 3-4. For the item requiring information on the number of graduates required in the new course enter the steady state number. You will have an opportunity to examine the impacts of phased requirements in the sensitivity analyses described in Section 3.10. The attrition rate you enter must be a decimal number between .00 and .99. You must enter the decimal point and at least one but no more than two digits. At this point, the program has all of the information needed to calculate numbers of instructors and course costs. It will estimate these numbers as soon as you have entered the last resource data element. The cursor will disappear from the screen while the VISICALC program is computing.

3.9 EXAMINE RESULTS

The estimate of instructor requirements for the new course will be listed in the Resource Parameter section of the worksheet (see figure 3-8). Course costs will be listed in the New Course Spreadsheet section of the worksheet (see figure 3-8). To get to the latter section, hit the right arrow key.

3.10 CONDUCT SENSITIVITY ANALYSIS

One of the most powerful features of VISICALC is the ease with which it can be used to conduct sensitivity analyses. More specifically, using VISICALC you quickly change a number of parameters or input values and immediately observe the impact of the changes.

In RCET, there are two major variables which can be used to assess the overall results of the RCET analyses: (1) number of instructors and (2) total cost per graduate (see figure 3-8). The RCET worksheet has built-in commands which will allow you to fix these two variables in a permanent "window" at the bottom of your screen. This window will remain in place while you move about the worksheet and change any of the other values on the worksheet. Using this window, you can instantly see the impact that changes will have on these two key variables.[1] To create the window, you must:

- While holding the CONTROL key down, press the K key

[1]Because of a flaw in the VISICALC program logic, it may be necessary to enter the data element to be changed twice before the impact will be assessed. You should thoroughly examine the VISICALC manual before conducting sensitivity analyses.

- Then, hit the A key.

To remove the window, you must:

- Hit /,
- Hit W,
- Hit 1 (one)

One set of impacts that you will definitely want to assess is the impact of the phased student input requirements. Other likely areas for impact or sensitivity analyses are changes to the student/instructor ratios, number of instructors, and reference course costs. A worksheet for documenting the results of the sensitivity analyses is listed in Table 3-6.

It should be noted that there are many additional things you can do with the VISICALC program. (For example, create new algorithms, modify existing RCET algorithms). You should consult the VISICALC User's Guide to learn more about these features.

3.11 COPY RESULTS TO VISICALC OUTPUT FILE

Once you have completed your analysis, you should copy the costs which were estimated for the new course back into the SDT. To do this, you must first copy these costs into a permanent file on your PROFILE disc.

Table 3-7. Worksheet for Documenting Sensitivity Analyses (RCSEN).

Parameter_____

Values	No. of Instructors	Total Cost/Grad.	Other

Parameter_____

Values	No. of Instructors	Total Cost/Grad.	Other

Parameter_____

Values	No. of Instructors	Total Cost/Grad.	Other

This can be accomplished by:

- Hitting the CONTROL key, and
- At the same time, hitting the K key
- Then, hitting the S key.

To complete the transfer of the course to the SDT, you must exit the VISICALC program and enter the SDT. To exit the VISICALC programs, remove the RCET Worksheet and VISICALC program diskette from the disk drives and put the SDT Boot Diskette into the built-in drive.

3.12 READ RESULTS INTO SDT

To read the new course costs generated by the VISICALC software back into the SDT, you must (1) enter the applications mode of the SDT and (2) apply RCET applications software. More details on these two procedures are provided in the sections which follow.

3.12.1 Enter Applications Mode of SDT

Procedures for entering the applications mode of the SDT are described in Section 3.6.1.

3.12.2 Apply RCET Software

To copy the new course costs generated by VISICALC back into the SDT you must perform actions on two frames or menus.

Action 1: Select Option (RC-1)

A menu will appear on the screen asking you to select from two options for either (1) copying data to a VISICALC input file or (2) copying VISICALC results to SDT (see figure 3-2). Move the cursor to Copy VISICALC Results to SDT and hit RETURN.

Action 2: Copy Complete (RC-4)

At this point, cost data for the new course should be copied to the SDT. When the data has been completely copied, you should get the message listed in Figure 3-9.

RESOURCE AND COST ESTIMATION TECHNIQUE

DATA SUCCESSFULLY COPIED FROM VISICALC FILES TO SDT DATA BASE FOR COURSE: XXXX

Figure 3-9. Completed Copy From VISICALC (RC-5).

APPENDIX A
Technical Description of RCET Algorithms

A.1 ALGORITHMS FOR RETURNING COURSE COSTS

The algorithms for determining course costs are listed in Table A-1.

A.2 ALGORITHM FOR DETERMINING NUMBER OF INSTRUCTORS

The number of instructors is determined using the algorithm listed in Table A-2. The algorithm is derived from the procedures listed in the Staffing Guide for U.S. Army Service Schools (DA Pam 570-558).

Table A-1. Algorithms for Determining Course Costs.

A.1 Resource Parameters

$$\text{course frequency} = \frac{\text{number of grads required}}{(1 - \text{expected course attrition}) * \textit{class size}}$$

$$\text{instructor contact hours per year} = \left(\sum_{\text{methods}} \text{instructor contact hours per method} \right) * \text{course frequency}$$

$$\text{course length} = \frac{1}{8} \left[\left(\sum_{\text{methods}} \text{method length} \right) + \text{administrative time} \right]$$

$$\text{number of instructors} = \frac{\text{instructor contact hours per year}}{1250}$$

Table A-1 (continued)

A.2 Proposed Course Cost Components

A.2.1 instructional department (OMA)

$$= \left[\frac{\text{reference instructional department (OMA)}}{\text{reference direct mission fixed (OMA)} + \text{reference direct mission variable (OMA)}} * \text{reference direct mission fixed (OMA)} * \frac{\text{reference number of norm grads}}{\text{number of grads required}} \right]$$

$$+ \left[\frac{\text{reference instructional department (OMA)}}{\text{reference direct mission fixed (OMA)} + \text{reference direct mission variable (OMA)}} * \text{reference direct mission variable (OMA)} * \frac{\text{reference number of norm grads}}{\text{number of grads required}} * \frac{\text{ich per year}}{\text{reference ich per year}} \right]$$

computed similarly: instructional department (MPA)
other (OMA), (MPA)

A.2.2 flying hour (OMA)

$$= \frac{\text{reference flying hour (OMA)} * \text{course length}}{\text{reference course length}}$$

computed similary: flying hour (MPA)
troop support P8 (OMA), (MPA), (PA)
troop support P2/3 (OMA), (MPA), (PA)
ammunition (PA)
equipment item depreciation (PA)
student pay and allowances, officer (MPA)
student pay and allowances, enlisted (MPA)
per diem at course(OMA)

Table A-1 (continued)

A.2.3 Direct mission subtotal (OMA) = instructional department (OMA) + flying hour (OMA) + other (OMA)

computed similarly: direct mission subtotal (MPA)

A.2.4 travel pay to course (OMA) = reference travel pay to course (OMA)

computed similarly: travel pay to course (MPA)

A.2.5 total direct costs (OMA) = direct mission subtotal (OMA) + troop support P8 (OMA) + troop support P2/3 (OMA) + travel pay to course (OMA) + per diem at course (OMA)

A.2.6 total direct costs (MPA) = direct mission subtotal (MPA) + troop support P8 (MPA) + troop support P2/3 (MPA) + student pay and allowances officer (MPA) + student pay and allowances enlisted (MPA) + travel pay to course (MPA)

Table A-1 (continued)

A.2.7 total direct costs (PA) = troop support P8 (PA) + troop support P2/3 (PA) + ammunition (PA) + equipment item depreciation (PA)

A.2.8 base operations (OMA) =

$$\left[\frac{\text{reference base operations (OMA)} * \left(\text{reference total direct and indirect fixed (OMA)} - \text{reference direct mission fixed (OMA)}\right)}{\text{reference total direct and indirect fixed (OMA)} + \text{reference total direct and indirect variable (OMA)} - \text{reference direct mission fixed (OMA)} - \text{reference direct mission variable (OMA)}} * \frac{\text{reference number of norm grads}}{\text{number of grads required}}\right]$$

$$+\left[\frac{\text{reference base operations (OMA)} * \left(\text{reference total direct and indirect fixed (OMA)} - \text{reference direct mission variable (OMA)}\right)}{\text{reference total direct and indirect fixed (OMA)} + \text{reference total direct and indirect variable (OMA)} - \text{reference direct mission fixed (OMA)} - \text{reference direct mission variable (OMA)}} * \frac{\text{reference number of norm grads}}{\text{number of grads required}} * \frac{\text{course length}}{\text{reference course length}}\right]$$

computed similarly: base operations (MPA)
support costs, training aids (OMA), (MPA)
support costs, other (OMA), (MPA)

A.2.9 support costs, other (FHMA) = reference support costs, other (FHMA) * $\frac{\text{reference number of norm grads}}{\text{number of grads required}}$

Table A-1 (continued)

A.2.10 total indirect costs (OMA) = base operations (OMA) + support costs, training aids (OMA) + support costs, other (OMA)

computed similarly: total indirect costs (MPA)

A.2.11 total indirect costs (FHMA) = support costs, other (FHMA)

A.2.12 total direct and indirect (OMA) = total direct costs (OMA) + total indirect costs (OMA)

computed similarly: total direct and indirect (MPA), (PA), (FHMA)

A.2.13 total cost per graduate = total direct and indirect (OMA) + total direct and indirect (MPA) + total direct and indirect (PA) + total direct and indirect (FHMA)

TABLE A-2 ALGORITHM FOR DETERMINING NUMBER OF INSTRUCTORS

1. Determine the number of Instructor Contact Hours (ICH) per class.

$$\text{ICH per class} = \sum_{i=1}^{NM} \frac{\text{hours of method i x class size}}{\text{student/instructor ratio for method i}}$$

where NM is the number of methods.

2. Determine the number of instructors.

$$\text{number of instructors} = \text{ICH per class} \times \frac{\text{course frequency}}{1250}$$

APPENDIX B
Logic Among RCET Frames and Menus

An overview of the logic among RCET frames and menus is provided in Figure B-1.

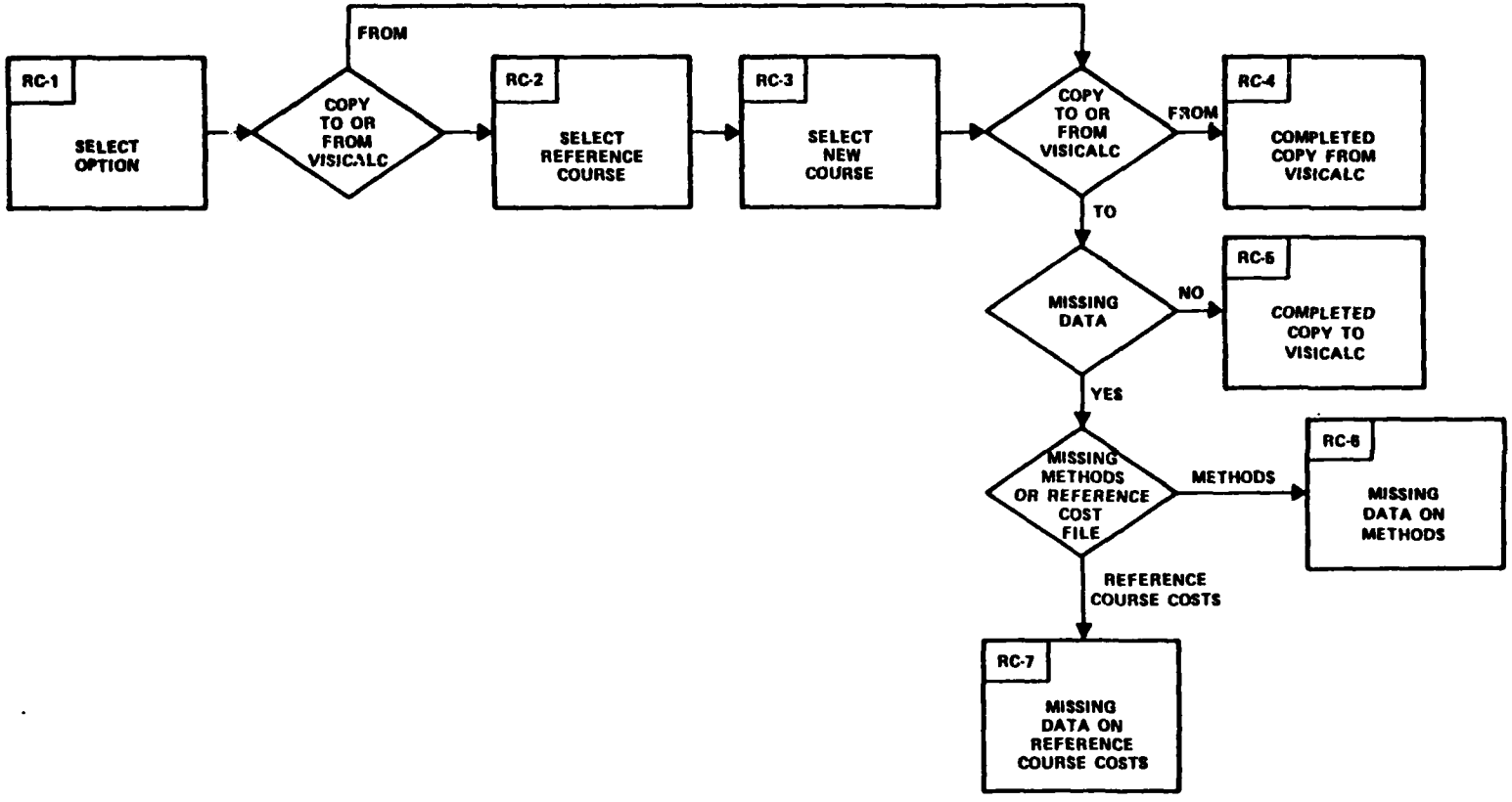

Figure B-1. Logic Among RCET Frames and Menus.